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NATIONAL MARINE FISHERIES SERVICE
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October 26, 1992

F/AKC1:NP

NOAA SHIP MILLER FREEMAN
Cruise No. 92-02
Echo Integration-Midwater Trawl Survey
of Pollock in the Bering Sea and Gulf of Alaska
Preliminary Cruise Results

CRUISE PERIOD, AREA AND SCHEDULE

Scientists from the Alaska Fisheries Science Center (AFSC) conducted an echo integration-midwater trawl (EIMWT) survey of walleye pollock (Theragra chalcogramma) aboard the NOAA ship Miller Freeman from February 21 to April 1, 1992 for a total of 40 sea days. The cruise began and ended in Kodiak, Alaska. The areas of operations included the southeast Bering Sea shelf, basin waters near Bogoslof Island, offshore waters near Sanak and Chirikof Islands, the Marmot Gully, and shelf regions southeast of Kodiak Island and the Shelikof Strait area.

The vessel's itinerary was as follows:

Leg 1

| | |
|--------------|---|
| Feb 21 | Departed Kodiak; calibrated system in Ugak Bay. |
| Feb 22 | Surveyed near Chirikof Island. |
| Feb 23-25 | Transited to Bering Sea shelf. |
| Feb 25-29 | Surveyed southeast Bering Sea shelf. |
| Feb 29-Mar 8 | Surveyed Bogoslof Island region. |
| Mar 9 | Surveyed area near Sanak Island. |
| Mar 9-11 | Transited to Kodiak; vessel arrived. |
| Mar 12 | Inported Kodiak. |

Leg 2

| | |
|-----------|--|
| Mar 13 | Departed Kodiak. |
| Mar 13-14 | Surveyed Marmot Gully area. |
| Mar 14-17 | Surveyed area southeast of Kodiak Island. |
| Mar 18-19 | First survey of small area southwest of Chirikof Island. |
| Mar 19-25 | First survey of Shelikof Strait. |



Mar 25-27 Calibrated system in Malina Bay. Second survey of portion of Shelikof Strait (spawning aggregation).

Mar 27-29 Second survey of area southwest of Chirikof Island in response to reports of spawning aggregation.

Mar 30-31 Third survey of Shelikof Strait to obtain maturity and ichthyoplankton samples.

Mar 31-Apr 1 Transited to Kodiak; cruise ended.

OBJECTIVES

The principal objectives of the cruise were to:

1. Collect echo integration data and midwater and demersal trawl data necessary to determine the distribution, biomass, and biological composition of walleye pollock in the area of operations.
2. Collect pollock tissue samples (gonad and liver) for stock structure studies.
3. Calibrate the acoustic system using standard sphere techniques.
4. Record observations of lamprey scars on pollock flesh as part of a study to determine the use of lamprey scars as a tag in stock structure research.
5. Collect samples of cephalopods for a marine mammal prey study.
6. Collect stomach contents data for the food habits studies.
7. Spawn mature pollock from the Bogoslof Island and Shelikof Strait areas and culture fertilized pollock eggs for laboratory experiments on larval pollock growth rate and metabolism.
8. Collect temperature and salinity profile data in areas of pollock abundance.
9. Collect ichthyoplankton samples in selected areas to detect the presence of pollock eggs. Collect zooplankton samples for immunoassay studies of pollock egg predation.
10. Collect whole pollock samples for use in a study of the feeding energetics of sea lions.

VESSEL, ACOUSTIC EQUIPMENT, AND TRAWL GEAR

The survey was conducted on board the NOAA ship Miller Freeman, a 66 m (216-foot) stern trawler equipped for fisheries and oceanographic research. Acoustic data were collected with a

quantitative echo sounding system (Simrad EK500¹). A Simrad 38 kHz split beam transducer was mounted on the distal end of the vessel's centerboard. The transducer is at a depth of 10 m below the surface of the water when the centerboard is fully extended. System electronics were housed in a portable laboratory mounted on the weather deck of the vessel. Data from the Simrad EK500 echo sounder/receiver were processed using Simrad BI500 echo integration and target strength data analysis software on a SUN workstation.

Midwater echo sign was sampled using a modified Northern Gold 1200 midwater rope trawl (NET Systems, Inc.). The trawl was constructed with ropes in the forward section and stretch mesh sizes ranging from 163 cm (64 inches) immediately behind the rope section to 8.9 cm (3.5 inches) in the cod end. It was fished in a bridleless configuration and was fitted with a 3.2 cm (1.25 inch) mesh cod end liner. Headrope and footrope lengths were 94.5 m (310 ft.) and 50 m (164 ft.), respectively, and the breastlines measured 79.4 m (260.5 ft.). The headrope length was measured between the points of attachment to the breastline. The footrope length was measured between the points where the tom weights are attached. The net was fished with 1.8 m X 2.7 m (6 ft. X 9 ft.) steel V-doors (1000 kg [2200 lb.]), and 340 kg (750 lb.) tom weights on each side. Trawl mouth opening and depth were monitored with a Furuno wireless netsounder system attached to the headrope of the trawl.

Two additional trawls were used to sample fish under different circumstances. Fish on and near bottom were sampled with a nylon Noreastern demersal trawl equipped with 31.1 m (102 ft.) long roller gear and 54.8 m (30 fm) triple dandylines. Net mesh sizes ranged from 12.7 cm (5 inches) in the body and 8.9 cm (3.5 inches) in the intermediate and codend to 3.2 cm (1.25 inch) in the codend liner. Headrope and footrope lengths were 27.4 and 32.0 m (90 ft. and 105 ft.), respectively. Smaller organisms and juvenile fish in midwater were sampled with a Marinovich midwater trawl, with meshes measuring 7.6 cm (3.0 inches) forward, 3.2 cm in the codend, and 0.32 cm (1/8 inch) in the codend liner. Headrope and footrope lengths were each 9.1 m (30 ft.). The Marinovich trawl and the nylon Noreastern demersal trawl were fished with the same steel V-doors used with the rope trawl. Trawl mouth opening and depth were monitored with the Furuno netsounder system.

In the Bogoslof area, ichthyoplankton samples were collected with a 60 cm bongo frame outfitted with a 505 micron mesh net. In the Gulf of Alaska, ichthyoplankton and zooplankton samples were collected using a Tucker Trawl equipped with a 505 micron mesh net. Contents were preserved in a buffered solution of 5% formalin and 95% seawater.

¹ Reference to trade names or commercial firms does not constitute U.S. government endorsement.

Water temperature/salinity profile data were collected at trawl and calibration sites using a Seabird CTD (conductivity/temperature/depth) system. Expendable bathythermographs (XBT) were launched routinely during the survey period to provide additional temperature profile data.

SURVEY METHODS

Survey operations were conducted both day and night. While transecting, vessel speed averaged about 11 knots, with the speed varying between 5 and 12 knots depending upon weather conditions. The acoustic system collected echo integration data and split beam target strength data. Target strength data will be interpreted together with historical target strength information and then used to scale echo integration values to provide estimates of pollock density (kg/m^2).

Midwater and demersal trawl hauls were made at selected locations to identify echo sign and provide biological samples. The average trawling speed was about 3 knots. The vertical net opening for the midwater rope trawl averaged about 20 m and ranged between 17 and 25 m. The net opening for the Marinovich midwater trawl was 4-5 m. The mouth opening was 8-10 m for the nylon Noreastern demersal trawl when using scope ratios based upon net sounder observation of gear contact with bottom and 4-6 m when using recommended scope ratios. Standard catch sorting and biological sampling procedures were used to provide weight and number by species for each haul. Pollock were further sampled to determine sex, length, body weight, age, maturity, gonad weight, stomach contents, and incidence of lamprey scars. In certain areas, whole pollock samples were frozen for sea lion energetic studies and tissue samples were collected and frozen for stock structure studies.

PRELIMINARY RESULTS

Standard sphere calibrations

Standard sphere calibrations were conducted in Port Susan on February 9 during Miller Freeman Cruise 92-1, in Ugak Bay, Kodiak Island on February 21 prior to the start of the survey, and in Malina Bay, Kodiak Island on March 25 near the end of the survey. In Ugak Bay, the vessel was anchored fore and aft to keep the ship from moving during the data collection. In Malina Bay, conditions were such that the vessel needed only to be anchored at the bow. Acoustic measurements were made of a copper sphere suspended below the transducer. The standard sphere (38.6 mm diameter) had a known target strength of -33.6 dB. Split beam target strength and echo integration data were collected with the Simrad EK500 system. Data were collected to describe transducer beam pattern characteristics and any variables in system parameters. No significant differences in the acoustic system parameters were observed among the three calibrations.

Biological and oceanographic data collection

Biological data were collected and specimen and tissue samples preserved for all survey areas. Trawl station and catch data from 47 midwater (including 44 rope and 3 Marinovich) and 13 demersal trawl hauls are summarized in Tables 1 and 2. In both the Bering Sea and Gulf of Alaska, pollock was the dominant fish species captured in both midwater and demersal trawl hauls (Tables 3-7). Tallies of biological data collected for pollock are presented in Tables 8 and 9. Oceanographic data collection consisted of a total of 48 CTD casts (Table 10) and 17 XBT casts (Table 11). Two bongo tows were made in the Bogoslof Island area (near trawl hauls 24 and 25). Six tucker trawls were made in the Gulf of Alaska - five in the Shelikof Strait where spawning pollock had been captured in trawl hauls and one southwest of Chirikof Island near trawls 56 and 57. Detailed analysis of these samples has not been completed. Approximately 400 kg of pollock were preserved for sea lion energetic studies.

Survey - Leg 1

The survey began near Amak Island in the Bering Sea and proceeded westward to the Islands of Four Mountains. The vessel trackline followed north-south transects positioned north of the Aleutian Chain (Figure 1). East of $166^{\circ} 30'W$ longitude, transects were spaced 15 nmi apart and extended to approximately $56^{\circ} 10'N$ latitude; west of $166^{\circ} 30'W$, transects were spaced 10 nmi apart and extended to about $55^{\circ} 00'N$. Trackline mileage totalled 2400 nmi. East of $164^{\circ} 45'W$ over the continental shelf, pollock echo sign was primarily found on or near the bottom. Fish in these aggregations were generally large adults ranging from 40 to 65 cm in length (Figure 2A). West of $164^{\circ} 45'W$, dense midwater aggregations were encountered. These fish were smaller and immature, ranging in size from 30 to 40 cm (Figure 2B). Though no active spawning was observed on the shelf, most of the large adult pollock (>40 cm) were in a mature reproductive state (Figure 3A).

Dense concentrations of pollock were encountered in the southeastern Aleutian Basin near Bogoslof Island. These aggregations were found at a depth of 400-500 meters from the surface. The fish ranged in length from 40 to 60 cm (Figure 2C). Preliminary analysis of acoustic data from the Bogoslof Island area indicates that the biomass is similar to the winter 1991 estimate. The majority of the fish were in a mature reproductive condition ready to spawn. The average gonado-somatic index (GSI) for mature (prespawning) female pollock from the Bogoslof Island region was significantly larger than that for mature female fish from the eastern Bering Sea (Figure 3B). These data imply that spawning occurs first in the Bogoslof Island region and then later in waters over the continental shelf. As of the last day of surveying near Bogoslof Island on March 8, no significant quantities of actively spawning female fish had been captured in the trawl. However, ichthyoplankton samples in the vicinity of hauls 24 and 25 near Bogoslof Island contained pollock eggs - indicating that some spawning had occurred.

The offshore waters near Sanak Island and Chirikof Island were also surveyed during this leg (Figure 1). Low density aggregations of pollock were observed near Sanak Island; no significant echo sign from pollock was observed near Chirikof Island.

Survey - Leg 2

During March 13 to April 2, RACE scientists completed an echo integration/midwater trawl survey of Marmot Bay, the east side of Kodiak Island, the area near Chirikof Island, and Shelikof Strait (Figures 4 and 5). As has been typical of other surveys on the east side of Kodiak Island, significant quantities of pollock were observed only in the Marmot Bay area. Only a few isolated midwater schools were observed in the Chiniak and Barnabas Gully areas. Before the survey in Shelikof, a brief survey was conducted in areas near Chirikof Island and, as before, no significant pollock sign was observed. (A larger area southwest of Chirikof Island was surveyed later in the cruise in response to reports of pollock aggregations from commercial fishing vessels; see below.)

The survey of the prespawning pollock in the Shelikof Strait area indicated a distribution similar to that observed in recent years, with the densities highest in the northern part of the Strait, on the northwest side, near Kuliak Point. Abundance in the prespawning aggregation within Shelikof Strait appears to be about the same, or slightly higher than last year. Examination of length composition indicates a mode at about 36 cm and another at about 50 cm (Figure 6A). The former mode is probably comprised mainly of fish from the 1988 year class. Few fish in the size range of one to two year old pollock were observed within the Strait. The length composition of pollock observed southwest of the entrance to the Strait was dominated by a 36 cm mode (Figure 6B). Many of the fish of this length were observed in small, dense feeding schools. In Marmot Bay (Figure 6C), two size modes were observed - one at about 36 cm and the other at about 55 cm.

In all areas surveyed, pollock less than about 42 cm were almost all immature (Figure 7). These results indicate that very few of the 1988 year class are contributing to spawning in Shelikof Strait. The survey of the dense spawning concentration near Kuliak point appeared to occur during the peak of spawning. Of the females captured during March 25-26 (trawl stations 52, 53, and 54), 27% were categorized as spawning and only 5% were spent (already having spawned). In contrast, 65% were spawning and 29% were spent by March 31 (haul 60). GSI values observed for mature (prespawning) female pollock during Leg 2 (Figure 8) were similar to those observed for similar-sized fish in the Bogoslof area during Leg 1.

In response to fishing vessel reports of a large school of spawning pollock in an area southwest of Chirikof Island (Figure 4), RACE scientists conducted a survey of an area approximately 40 by 50 miles including all locations reported to contain

pollock concentrations. Although a scattering layer was observed in the same depth ranges as reported by the fishing vessels, no echo sign believed to be pollock was observed. The catch in two rope trawls and a single smaller midwater trawl (Marinovich) was comprised primarily of myctophids and other small organisms, but no pollock. A tucker trawl in the layer resulted in catches of primarily large copepods and some small myctophids, but no pollock eggs or larvae.

SCIENTIFIC PERSONNEL

| Name | Sex/ Nationality | Position | Organization |
|-------------------------|---------------------|-------------------|--------------|
| Leg 1 (Feb 21 - Mar 11) | | | |
| Neal Williamson | M/USA | Chief Scientist | AFSC |
| Dan Twohig | M/USA | Electronics Tech. | AFSC |
| Taina Honkalehto | F/USA | Fish. Biologist | AFSC |
| Denise McKelvey | F/USA | Biological Tech. | AFSC |
| Dennis Benjamin | M/USA | Biological Tech. | AFSC |
| Stephen de Blois | M/USA | Fish. Biologist | AFSC |
| Robin Harrison | M/USA | Fish. Biologist | AFSC |
| William Flerx | M/USA | Fish. Biologist | AFSC |

| | | | |
|------------------------|-------|-------------------|------|
| Leg 2 (Mar 13 - Apr 1) | | | |
| Jim Traynor | M/USA | Chief Scientist | AFSC |
| Dan Twohig | M/USA | Electronics Tech. | AFSC |
| Ed Nunnallee | M/USA | Fish. Biologist | AFSC |
| Matt Wilson | M/USA | Fish. Biologist | AFSC |
| Dennis Benjamin | M/USA | Biological Tech. | AFSC |
| Stephen de Blois | M/USA | Fish. Biologist | AFSC |
| Richard Brodeur | M/USA | Fish. Biologist | AFSC |

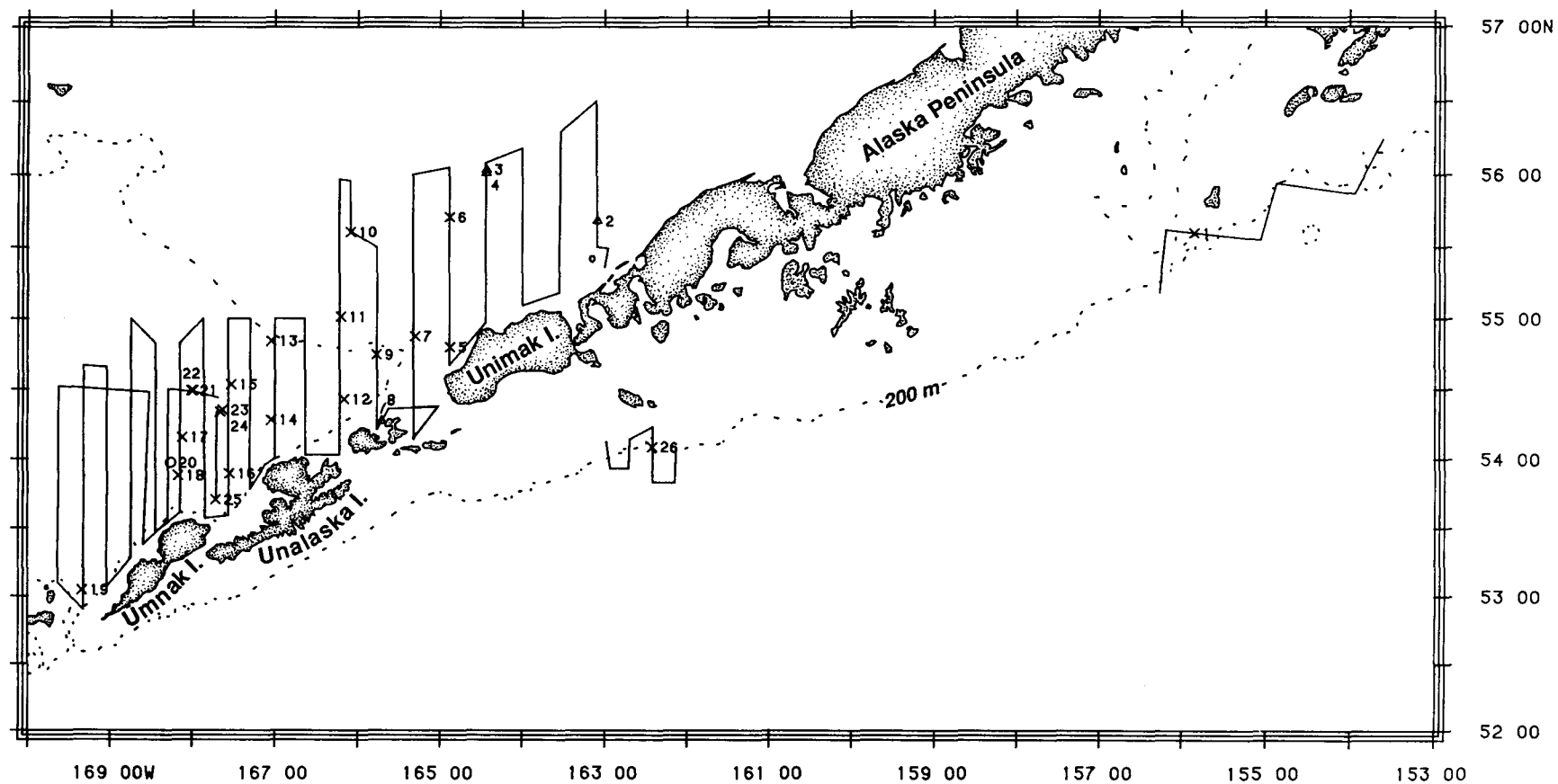


Figure 1. Survey trackline and trawl haul locations for the winter EIMWT survey of the Bering Sea and Gulf of Alaska, MF92-2, leg 1. Rope trawl (x), bottom trawl (Δ), and Marinovich trawl (o).

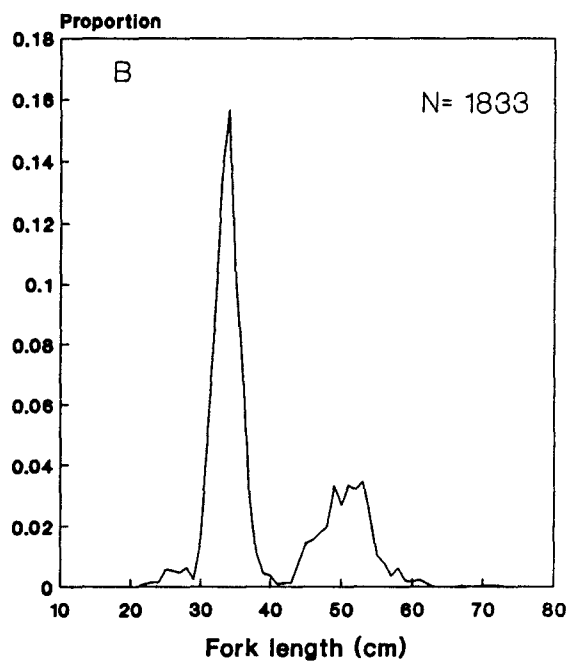
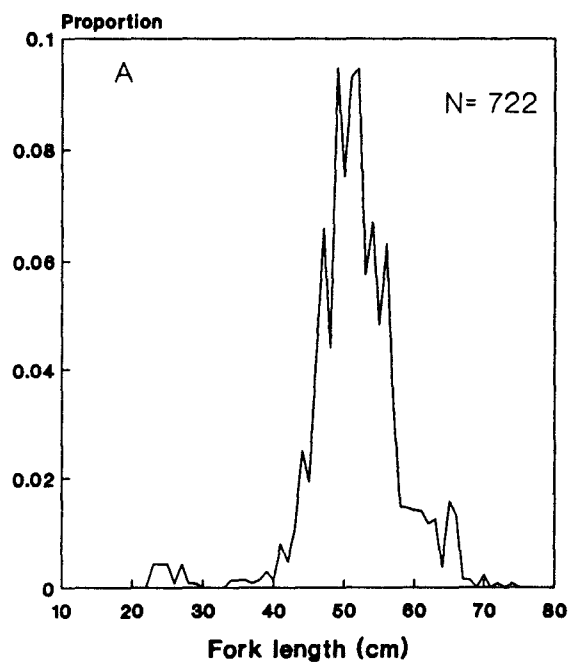
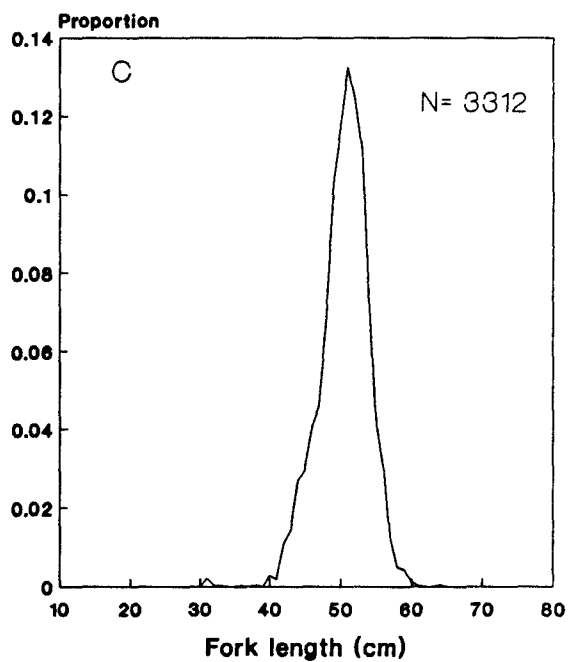


Figure 2. Preliminary pollock size compositions from A) bottom and B) midwater trawl catches on the EBS shelf and C) midwater trawl catches in the Bogoslof Island region, MF92-2.



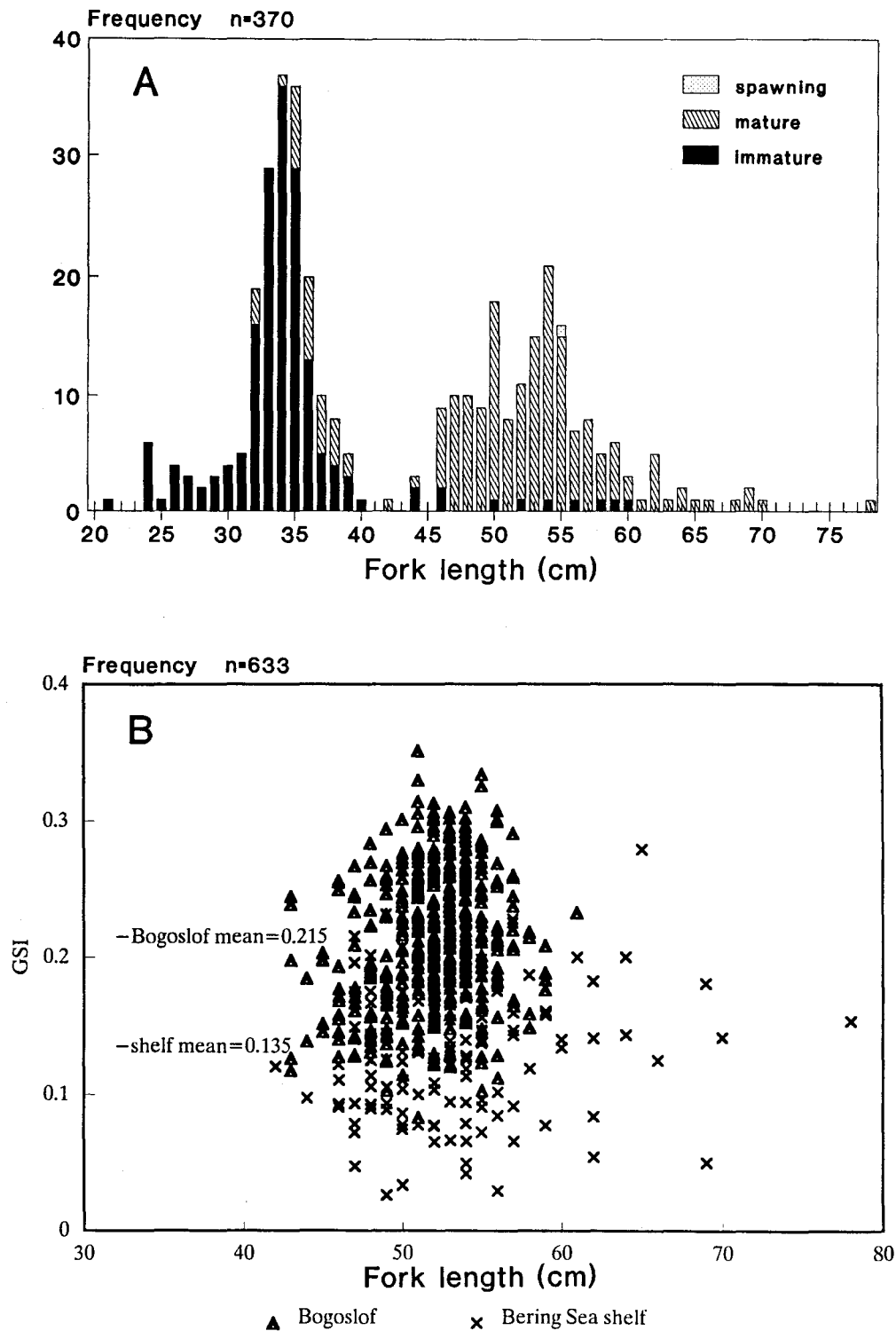


Figure 3. A) Female pollock maturity-length composition from the EBS shelf, and B) gonado-somatic index vs. length scatterplot for mature (prespawning) females from the EBS shelf and Bogoslof Island region. Relative proportion by size for maturity-length composition reflects the number of maturity samples collected and is not indicative of actual size composition of the population.

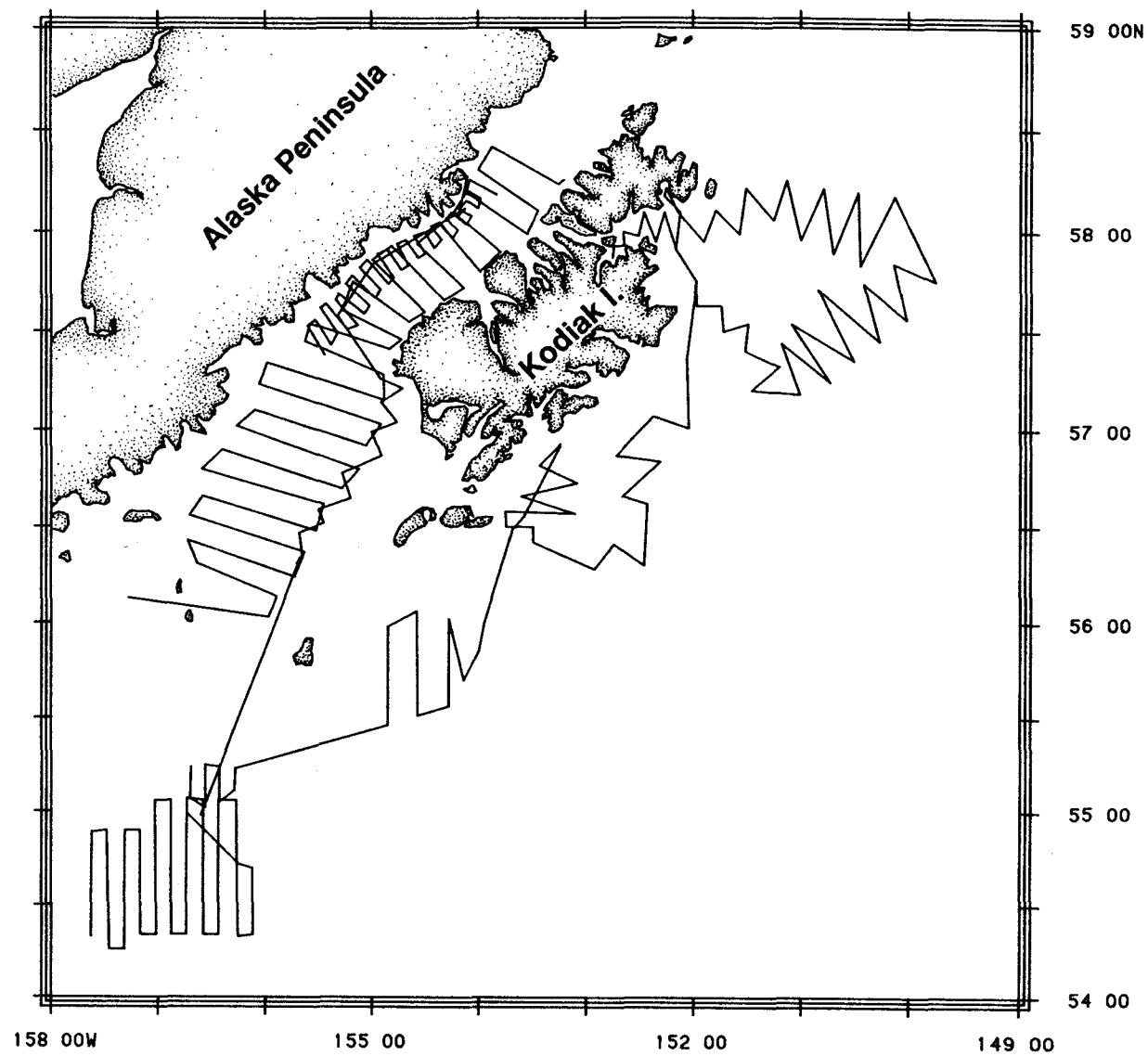


Figure 4. Survey trackline for the winter EIMWT survey of the Gulf of Alaska, MF92-2 leg 2.

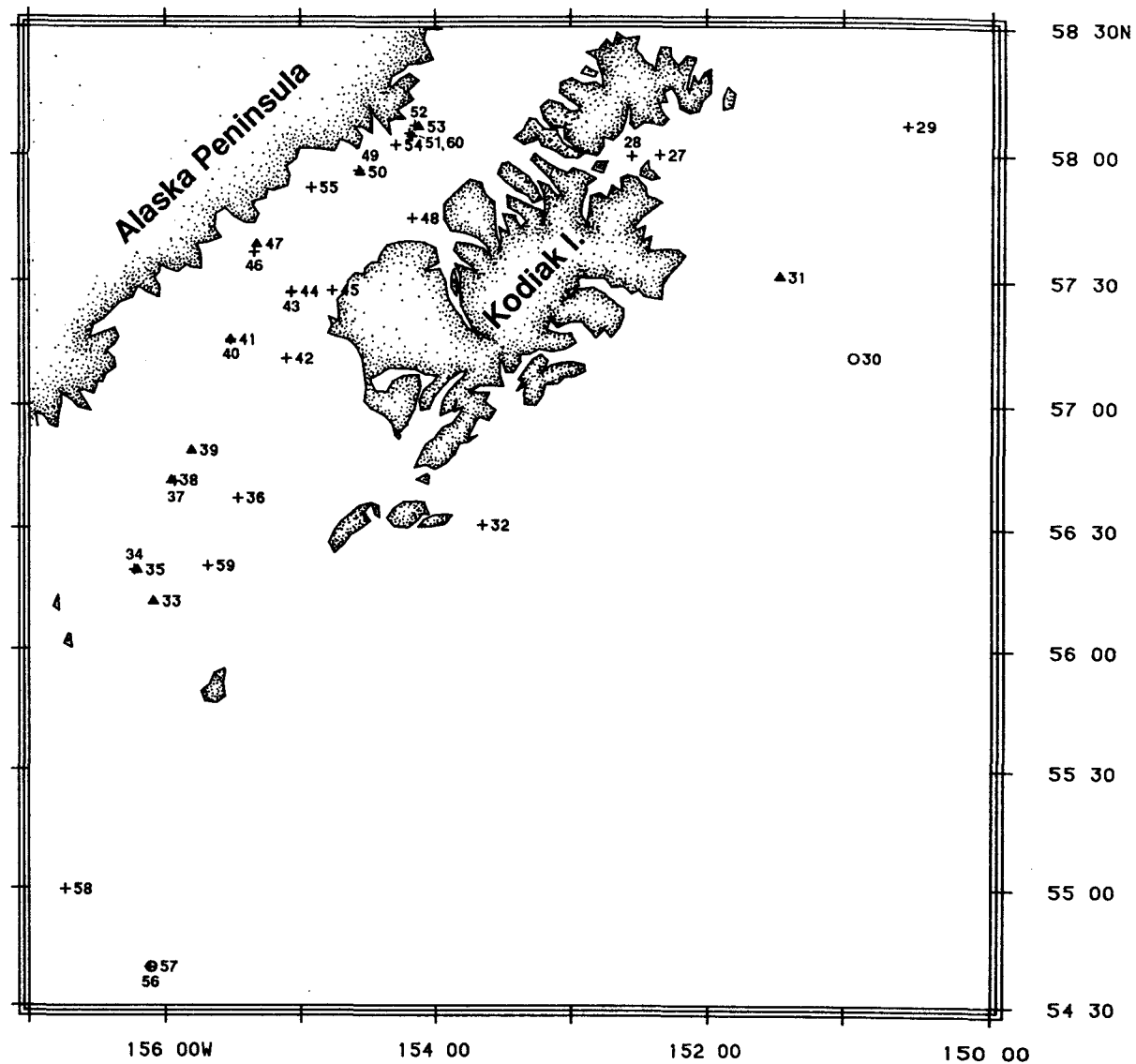


Figure 5. Trawl haul locations for the winter EIMWT survey of the Gulf of Alaska, MF92-2 leg 2. Rope trawl (x), bottom trawl (Δ), and Marinovich trawl (o).

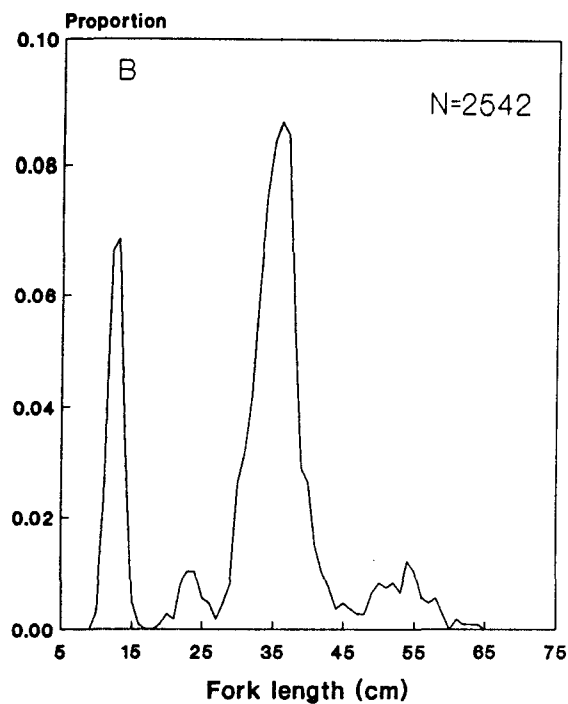
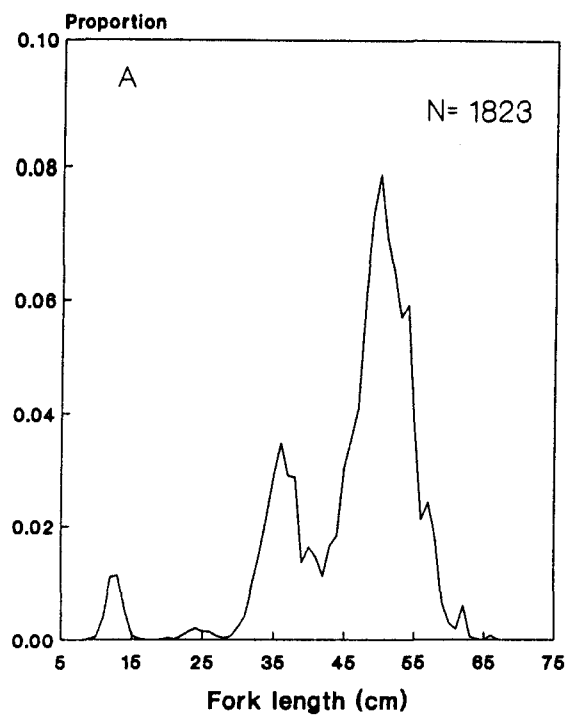
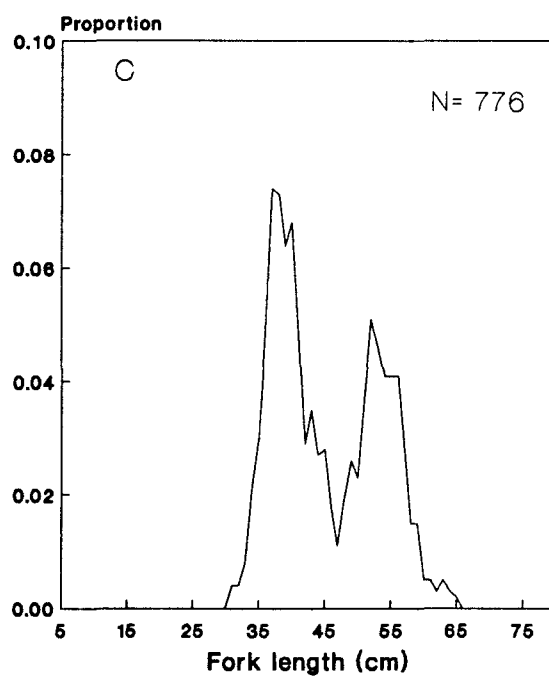


Figure 6. Preliminary pollock size compositions from A) Shelikof prespawning aggregation, B) southwest of the entrance to Shelikof Strait and C) Marmot Bay.



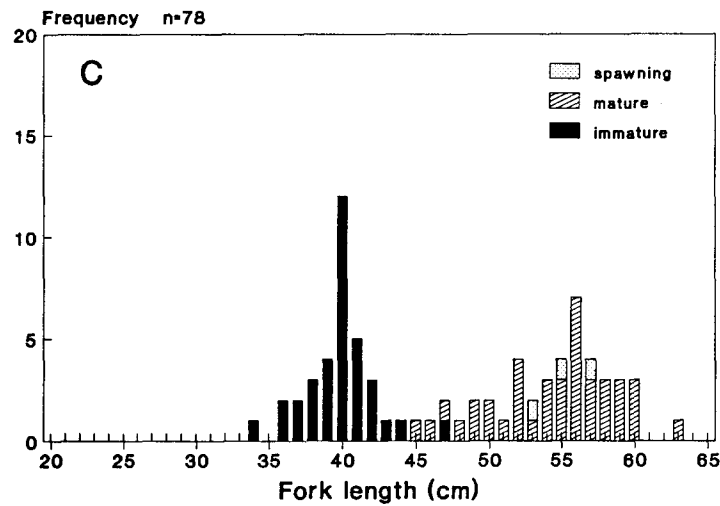
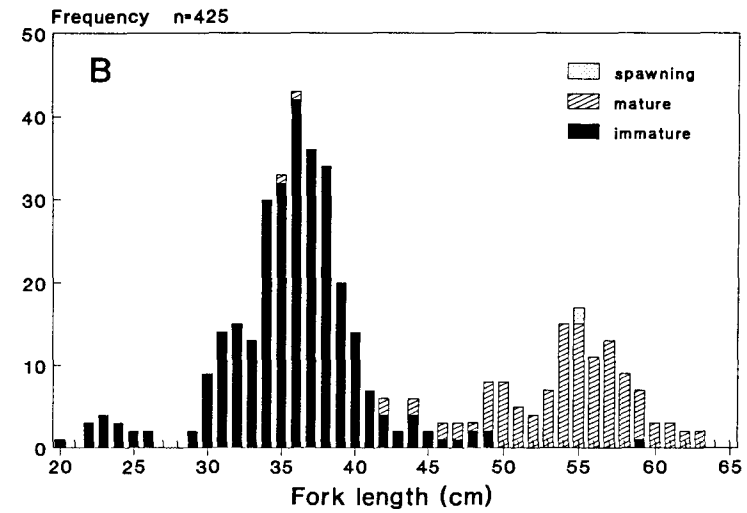
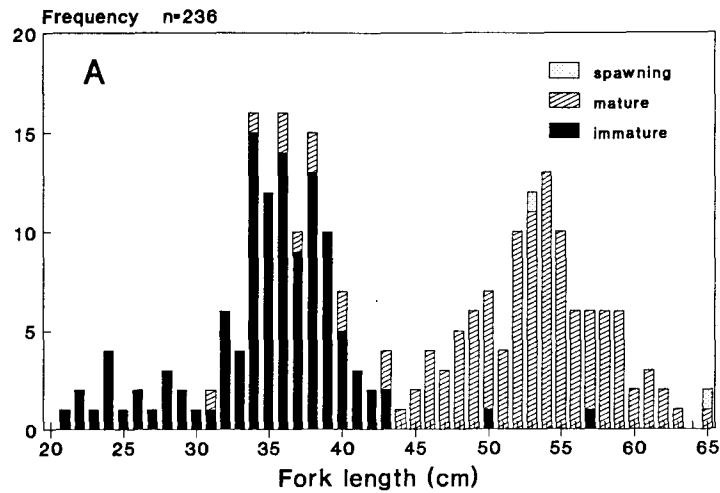


Figure 7. Female pollock maturity-length composition from A) Shelikof prespawning aggregation, B) southwest of the entrance to Shelikof Strait and C) Marmot Bay. Relative proportion by size reflects the number of maturity samples collected and is not indicative of actual size composition of the population.

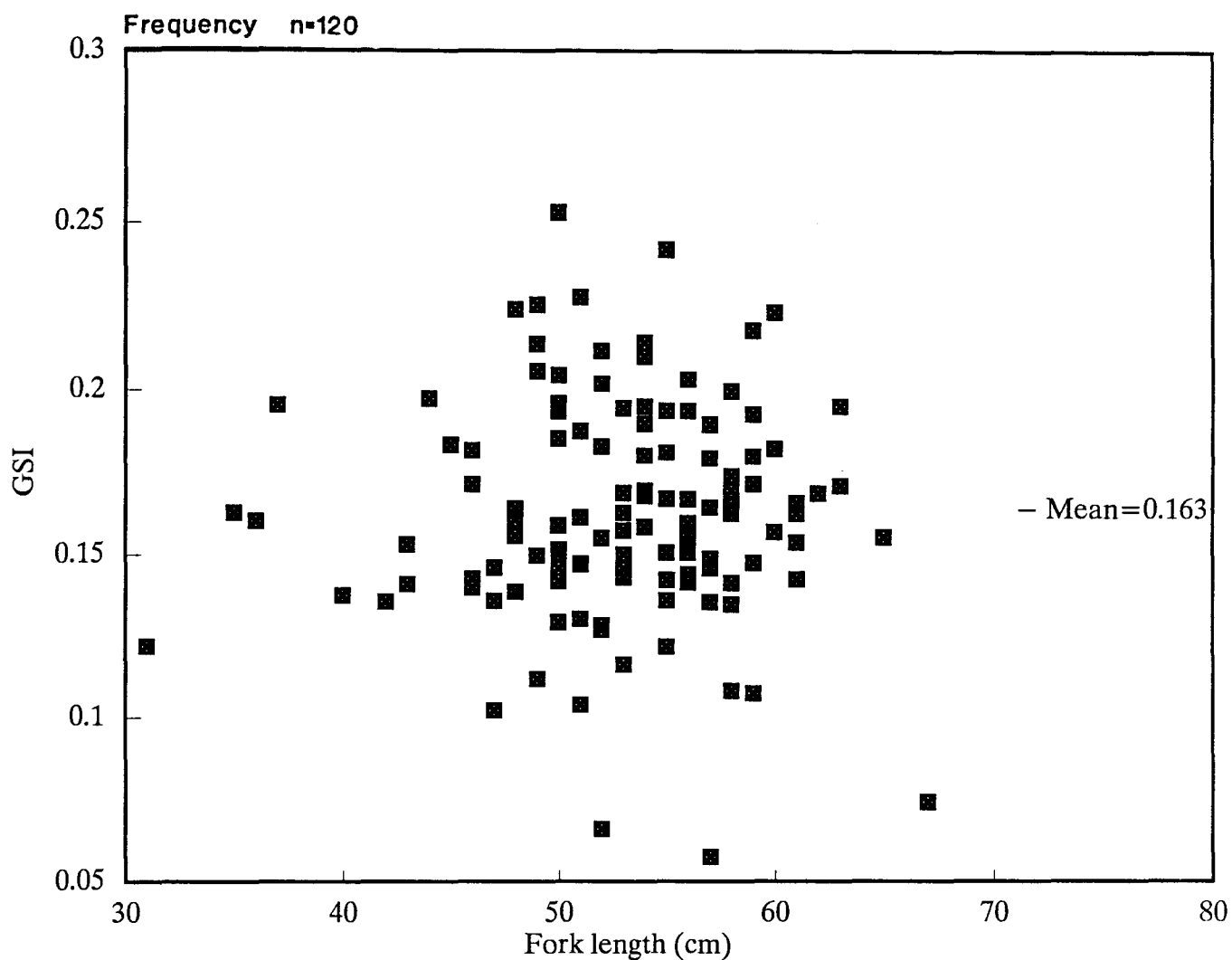


Figure 8. Gonado-somatic index vs. length scatterplot for mature (prespawning) female pollock from the Gulf of Alaska.

Table 1. Summary of trawl stations and catch data from the Bering Sea and Gulf of Alaska during the winter 1992 EIMWT pollock survey, Miller Freeman cruise 92-2, leg 1.

| | | | | | | | | | | | | CATCH (LBS/NOS.) | |
|----------|------|-------------|------------|----------------|-----------|----------|------|------------|------|---------|-------|------------------|---------|
| HAUL NO. | AREA | DATE (1992) | TIME (AST) | START POSITION | | TEMP (C) | | DEPTH (FM) | | WALLEYE | | | |
| | | | | LAT. (N) | LONG. (W) | GEAR | SURF | GEAR | BOTM | POLLOCK | OTHER | | |
| 1 | CH | 22 FEB | 1949-2008 | 55 | 35.9 | 155 | 51.3 | 4.1 | 4.0 | 30 | 104 | 0 | 24/2505 |
| * 2 | BS | 25 FEB | 1221-1236 | 55 | 40.9 | 163 | 5.8 | 2.0 | 2.0 | 40 | 40 | 11467/4962 | 333/236 |
| * 3 | BS | 26 FEB | 1308-1323 | 56 | 2.1 | 164 | 26.4 | 3.1 | 1.5 | 52 | 52 | 134/57 | 352/151 |
| * 4 | BS | 26 FEB | 1415-1430 | 56 | 0.7 | 164 | 26.5 | 3.1 | 1.5 | 52 | 52 | 2019/809 | 984/388 |
| 5 | BS | 27 FEB | 0140-0210 | 54 | 47.9 | 164 | 53.0 | 3.0 | 1.9 | 34 | 39 | 3898/1791 | 342/100 |
| 6 | BS | 27 FEB | 0921-0936 | 55 | 42.5 | 164 | 53.3 | 4.1 | 1.9 | 51 | 55 | 8792/10270 | 341/89 |
| 7 | BS | 27 FEB | 2116-2141 | 54 | 52.5 | 165 | 18.1 | 2.7 | 2.1 | 36 | 68 | 97/48 | T/0 |
| * 8 | BS | 28 FEB | 1019-1047 | 54 | 16.4 | 165 | 42.8 | 3.1 | 2.8 | 52 | 52 | 461/1865 | 52/33 |
| 9 | BS | 28 FEB | 1633-1709 | 54 | 44.7 | 165 | 46.3 | 4.0 | 2.2 | 90 | 121 | 2046/3727 | 0 |
| 10 | BS | 29 FEB | 0215-0217 | 55 | 36.3 | 166 | 5.5 | 4.0 | 1.8 | 49 | 68 | 4410/7625 | 0 |
| 11 | BS | 29 FEB | 1150-1212 | 55 | 0.8 | 166 | 12.6 | 4.0 | 2.0 | 66 | 78 | 1084/1966 | 33/8 |
| 12 | BG | 29 FEB | 1848-1857 | 54 | 25.7 | 166 | 10.3 | 3.4 | 2.6 | 297 | 299 | 1176/510 | 45/874 |
| 13 | BS | 1 MAR | 0827-0837 | 54 | 50.5 | 167 | 2.7 | 3.8 | 2.0 | 112 | 164 | 439/758 | 3/0 |
| 14 | BG | 1 MAR | 2017-2047 | 54 | 16.8 | 167 | 2.8 | 3.7 | 2.4 | 295 | 710 | 82/47 | 22/222 |
| 15 | BG | 2 MAR | 0744-0759 | 54 | 32.1 | 167 | 32.3 | 3.9 | 2.5 | 268 | 376 | 529/210 | 11/7 |
| 16 | BG | 2 MAR | 1446-1514 | 53 | 53.7 | 167 | 33.6 | 4.6 | 3.5 | 264 | 850 | 1620/684 | 13/151 |
| 17 | BG | 3 MAR | 0706-0717 | 54 | 9.4 | 168 | 7.3 | 3.8 | 3.5 | 201 | 1155 | 256/110 | 11/49 |
| 18 | BG | 3 MAR | 1236-1319 | 53 | 52.9 | 168 | 10.7 | 4.0 | 3.7 | 283 | 902 | 4624/2771 | 26/5 |
| 19 | BG | 5 MAR | 0420-0500 | 53 | 2.8 | 169 | 20.3 | 3.7 | 3.9 | 225 | 514 | 1074/434 | 9/6 |
| +20 | BG | 6 MAR | 1609-1712 | 53 | 58.4 | 168 | 15.8 | 3.8 | 3.3 | 157 | 1045 | 0 | 2/316 |
| 21 | BG | 6 MAR | 2257-2328 | 54 | 29.5 | 168 | 1.0 | 3.8 | 3.6 | 199 | 689 | 1090/490 | 6/2 |
| 22 | BG | 7 MAR | 0119-0159 | 54 | 29.5 | 167 | 59.8 | 3.7 | 3.6 | 289 | 677 | 501/257 | 6/300 |
| 23 | BG | 7 MAR | 1933-1952 | 54 | 21.1 | 167 | 38.5 | 3.8 | 3.7 | 181 | 447 | 9350/3579 | 0 |
| 24 | BG | 7 MAR | 2322-0016 | 54 | 20.3 | 167 | 40.2 | 3.8 | 3.7 | 286 | 455 | 3204/1614 | 3/41 |
| 25 | BG | 8 MAR | 1001-1006 | 53 | 42.4 | 167 | 43.6 | 3.7 | 3.5 | 159 | 714 | 2729/1436 | 2/3 |
| 26 | SA | 9 MAR | 0910-1010 | 54 | 5.0 | 162 | 25.5 | 4.4 | 3.3 | 208 | 408 | 1417/890 | 102/888 |

CH=Chirikof, BS=Bering Sea shelf, BG=Bogoslof, SA=Sanak

* Bottom trawl; + Marinovich trawl; all others midwater trawl

T=trace (i.e., <0.5 lb)

Table 2. Summary of trawl stations and catch data from the Gulf of Alaska during the winter 1992 EIMWT pollock survey, Miller Freeman cruise 92-2, leg 2.

| HAUL NO. | AREA | DATE (1992) | TIME (AST) | START POSITION | | TEMP (C) | | DEPTH (FM) | | CATCH (LBS/NOS.) | | |
|----------|------|-------------|------------|----------------|-----------|----------|------|------------|------|------------------|----------|-----------|
| | | | | | | | | | | WALLEYE | EULACHON | OTHER |
| | | | | LAT. (N) | LONG. (W) | GEAR | SURF | GEAR | BOTM | POLLOCK | | |
| 27 | MA | 13 MAR | 2255-2325 | 57 59.9 | 152 20.7 | 4.2 | 4.3 | 102 | 161 | 11242/4158 | 37/306 | 20/7 |
| 28 | MA | 14 MAR | 0629-0636 | 57 59.7 | 152 32.9 | 3.5 | 3.6 | 56 | 105 | 1487/1565 | T/1 | 16/2 |
| 29 | EK | 15 MAR | 0232-0243 | 58 6.9 | 150 32.3 | 5.3 | 5.1 | 48 | 97 | 0 | 0 | 3/157 |
| +30 | EK | 16 MAR | 0620-0720 | 57 11.6 | 150 55.5 | 5.6 | 5.4 | 172 | 336 | 0 | 0 | 13/394 |
| *31 | EK | 16 MAR | 1337-1344 | 57 31.0 | 151 28.0 | 3.7 | 3.9 | 81 | 81 | 105/61 | 0 | 104/53 |
| 32 | EK | 17 MAR | 2324-2330 | 56 30.7 | 153 39.0 | 3.9 | 3.9 | 55 | 77 | 3607/3083 | 0 | 8/3 |
| *33 | SH | 20 MAR | 0152-0217 | 56 11.7 | 156 5.1 | 5.3 | 3.7 | 133 | 133 | 64/271 | 2/21 | 285/133 |
| 34 | SH | 20 MAR | 0827-0912 | 56 19.6 | 156 13.4 | 5.2 | 3.4 | 137 | 153 | 1610/2018 | 79/1117 | 92/246 |
| *35 | SH | 20 MAR | 1108-1125 | 56 19.5 | 156 12.3 | 5.2 | 3.4 | 153 | 153 | 50/153 | 37/261 | 1201/865 |
| 36 | SH | 21 MAR | 0046-0059 | 56 37.3 | 155 27.6 | 3.5 | 3.4 | 39 | 80 | 2046/2445 | 0 | 18/6 |
| 37 | SH | 21 MAR | 0449-0459 | 56 41.4 | 155 55.7 | 5.4 | 3.7 | 135 | 163 | 1669/2030 | 115/1246 | 64/83 |
| *38 | SH | 21 MAR | 0646-0701 | 56 41.7 | 155 57.3 | 5.3 | 3.7 | 163 | 163 | 606/1157 | 136/756 | 628/241 |
| *39 | SH | 21 MAR | 1819-1830 | 56 48.9 | 155 48.5 | 5.2 | 3.4 | 161 | 161 | 484/971 | 30/178 | 4706/2335 |
| 40 | SH | 22 MAR | 1536-1552 | 57 15.8 | 155 30.9 | 5.2 | 3.6 | 142 | 148 | 1586/1427 | 57/622 | 20/49 |
| *41 | SH | 22 MAR | 1755-1812 | 57 15.8 | 155 31.0 | 5.2 | 3.6 | 149 | 149 | 136/285 | 451/4956 | 494/450 |
| 42 | SH | 22 MAR | 2322-2327 | 57 11.2 | 155 6.4 | 4.5 | 4.1 | 97 | 122 | 409/584 | 42/445 | 137/27 |
| 43 | SH | 23 MAR | 0830-0844 | 57 27.1 | 155 4.3 | 5.1 | 3.7 | 117 | 130 | 400/555 | 365/4634 | 9/19 |
| 44 | SH | 23 MAR | 1005-1015 | 57 27.3 | 155 4.1 | 5.2 | 3.7 | 127 | 128 | 3188/4130 | 911/7469 | 1/21 |
| 45 | SH | 23 MAR | 1348-1349 | 57 27.6 | 154 46.0 | 3.4 | 3.8 | 37 | 71 | 2999/3599 | 0 | 1/2 |
| 46 | SH | 23 MAR | 1814-1841 | 57 36.8 | 155 20.4 | 3.0 | 2.5 | 141 | 174 | 3535/3726 | 44/361 | 12/28 |
| *47 | SH | 23 MAR | 2101-2111 | 57 38.8 | 155 19.3 | 5.2 | 2.5 | 174 | 174 | 145/529 | 198/941 | 851/319 |
| 48 | SH | 24 MAR | 0810-0824 | 57 45.0 | 154 10.2 | 4.5 | 4.0 | 43 | 90 | 8588/8663 | T/1 | 2/2 |
| 49 | SH | 24 MAR | 1254-1306 | 57 56.3 | 154 33.9 | 5.2 | 2.5 | 122 | 144 | 565/459 | 6/65 | 2/19 |
| *50 | SH | 24 MAR | 1500-1505 | 57 55.9 | 154 33.4 | 4.9 | 2.5 | 146 | 146 | 2262/928 | 22/233 | 287/107 |
| 51 | SH | 24 MAR | 2209-2213 | 58 4.2 | 154 10.5 | 5.1 | 1.8 | 133 | 153 | 9600/5246 | 0 | 0 |
| 52 | SH | 25 MAR | 2016-2018 | 58 6.8 | 154 9.1 | 5.2 | 3.2 | 116 | 164 | 7309/2913 | T/3 | 11/2 |
| *53 | SH | 25 MAR | 2320-2322 | 58 6.5 | 154 7.5 | 5.2 | 3.2 | 154 | 154 | 2890/1085 | T/2 | 320/69 |
| 54 | SH | 26 MAR | 0449-0451 | 58 2.2 | 154 17.7 | 5.1 | 3.7 | 137 | 147 | 2511/1312 | 2/4 | 143/6 |
| 55 | SH | 26 MAR | 1321-1326 | 57 52.2 | 154 55.1 | 4.8 | 3.0 | 130 | 134 | 3707/2281 | 69/807 | 23/33 |
| 56 | CH | 29 MAR | 1013-1130 | 54 39.8 | 156 6.9 | 5.6 | 4.0 | 143 | 1504 | 0 | 0 | 3/75 |
| +57 | CH | 29 MAR | 1422-1452 | 54 39.9 | 156 6.3 | 5.4 | 4.0 | 161 | 1640 | 0 | 0 | 1/323 |
| 58 | CH | 29 MAR | 1904-2019 | 54 59.7 | 156 44.2 | 5.7 | 4.2 | 119 | 730 | 0 | 0 | 1/71 |
| 59 | SH | 30 MAR | 0746-0747 | 56 20.6 | 155 41.1 | 4.0 | 3.6 | 27 | 41 | 10585/13102 | 0 | 16/2 |
| 60 | SH | 31 MAR | 0828-0829 | 58 4.9 | 154 11.6 | 4.9 | 4.1 | 109 | 153 | 4577/1668 | 0 | 3/5 |

MA=Marmot Bay, EK=East Kodiak, SH=Shelikof, CH=Chirikof

* Bottom trawl; + Marinovich trawl; all others midwater trawl

T=trace (i.e., <0.5 lb)

Table 3. Summary of catch by species in 7 midwater rope trawls from the eastern Bering Sea shelf during the winter 1992 EIMWT pollock survey, Miller Freeman cruise 92-2.

| <u>Species</u> | <u>Weight</u> <u>(lbs.)</u> | <u>Percent</u> | <u>Numbers</u> | <u>Percent</u> |
|--|--------------------------------|----------------|----------------|----------------|
| Walleye Pollock (<u>Theragra chalcogramma</u>) | 20,764.9 | 96.6 | 26,185 | 99.1 |
| Pacific Cod (<u>Gadus macrocephalus</u>) | 304.6 | 1.4 | 49 | 0.2 |
| Jellyfish Unidentified (<u>Scyphozoa</u>) | 231.5 | 1.1 | - | - |
| Rock Sole (<u>Pleuronectes bilineatus</u>) | 83.9 | 0.4 | 72 | 0.3 |
| Yellow Irish Lord (<u>Hemilepidotus jordani</u>) | 22.5 | 0.1 | 14 | 0.1 |
| Alaska Skate (<u>Bathyraja parmifera</u>) | 19.0 | 0.1 | 2 | <.1 |
| Solaster Unidentified (<u>Solasteridae</u>) | 16.0 | 0.1 | 4 | <.1 |
| Bairdi Tanner Crab (<u>Chionoecetes bairdi</u>) | 11.4 | 0.1 | 12 | <.1 |
| Pacific Halibut (<u>Hippoglossus stenolepis</u>) | 7.3 | <.1 | 2 | <.1 |
| Flathead Sole (<u>Hippoglossoides elassodon</u>) | 7.2 | <.1 | 8 | <.1 |
| Smooth Lumpsucker (<u>Aptocyclus ventricosus</u>) | 6.0 | <.1 | 1 | <.1 |
| Bering Skate (<u>Bathyraja interrupta</u>) | 4.0 | <.1 | 1 | <.1 |
| Sturgeon Poacher (<u>Podothecus acipenserinus</u>) | 3.4 | <.1 | 19 | 0.1 |
| Eulachon (<u>Thaleichthys pacificus</u>) | 3.2 | <.1 | 33 | 0.1 |
| Salps Unidentified (<u>Thaliacea</u>) | 1.7 | <.1 | - | - |
| Starfish Unidentified (<u>Asteroidea</u>) | 1.0 | <.1 | 5 | <.1 |
| Pacific Herring (<u>Clupea pallasii</u>) | 0.2 | <.1 | 2 | <.1 |
| Hermit Crab Unidentified (<u>Paguridae</u>) | 0.1 | <.1 | 1 | <.1 |
| Arrowtooth Flounder (<u>Atheresthes stomias</u>) | 0.1 | <.1 | 1 | <.1 |
| Totals | 21,488.0 | 100.0 | 26,411 | 100.0 |

Table 4. Summary of catch by species in 4 bottom trawls from the eastern Bering Sea shelf during the winter 1992 EIMWT pollock survey, Miller Freeman cruise 92-2.

| <u>Species</u> | <u>Weight (lbs.)</u> | <u>Percent</u> | <u>Numbers</u> | <u>Percent</u> |
|---|--------------------------|----------------|----------------|----------------|
| Walleye Pollock (<u>Theragra chalcogramma</u>) | 14,080.2 | 89.1 | 7,693 | 90.5 |
| Jellyfish Unidentified (Scyphozoa) | 784.0 | 5.0 | - | - |
| Rock Sole (<u>Pleuronectes bilineatus</u>) | 276.5 | 1.8 | 320 | 3.8 |
| Flathead Sole (<u>Hippoglossoides elassodon</u>) | 240.0 | 1.5 | 211 | 2.5 |
| Pacific Cod (<u>Gadus macrocephalus</u>) | 233.3 | 1.5 | 61 | 0.7 |
| Bairdi Tanner Crab (<u>Chionoecetes bairdi</u>) | 76.2 | 0.5 | 122 | 1.4 |
| Great Sculpin (<u>Myoxocephalus polyacanthocephalus</u>) | 29.5 | 0.2 | 3 | <.1 |
| Yellowfin Sole (<u>Pleuronectes aspera</u>) | 27.0 | 0.2 | 32 | 0.4 |
| Pacific Halibut (<u>Hippoglossus stenolepis</u>) | 15.1 | 0.1 | 9 | 0.1 |
| Giant Octopus (<u>Octopus dofleini</u>) | 14.5 | 0.1 | 1 | <.1 |
| Sponge Unidentified (Porifera) | 9.4 | 0.1 | 16 | 0.2 |
| Arrowtooth Flounder (<u>Atheresthes stomias</u>) | 4.1 | <.1 | 4 | <.1 |
| Starfish Unidentified (Asteroidea) | 3.4 | <.1 | 11 | 0.1 |
| Alaska Plaice (<u>Pleuronectes quadrituberculatus</u>) | 2.5 | <.1 | 3 | <.1 |
| Pacific Herring (<u>Clupea pallasii</u>) | 1.2 | <.1 | 2 | <.1 |
| Basketstarfish (<u>Gorgonocephalus caryi</u>) | 1.0 | <.1 | 2 | <.1 |
| Yellow Irish Lord (<u>Hemilepidotus jordani</u>) | 0.9 | <.1 | 1 | <.1 |
| Sea Peach (<u>Halocynthia aurantium</u>) | 0.5 | <.1 | 1 | <.1 |
| Alaska Falsejingle (<u>Pododesmus macroschisma</u>) | 0.5 | <.1 | 2 | <.1 |
| Brittlestarfish Unidentified (Ophiuroidea) | 0.3 | <.1 | 1 | <.1 |
| Green Sea Urchin (<u>Strongylocentrotus droebachiensis</u>) | 0.1 | <.1 | 1 | <.1 |
| Tube Worm Unidentified (Polychaeta) | 0.1 | <.1 | 1 | <.1 |
| Nudibranch Unidentified (Nudibranchia) | 0.1 | <.1 | 1 | <.1 |
| Oregon Triton (<u>Fusitriton oregonensis</u>) | 0.1 | <.1 | 1 | <.1 |
| Hermit Crab Unidentified (Paguridae) | 0.1 | <.1 | 1 | <.1 |
| Totals | 15,800.6 | 100.0 | 8,500 | 100.0 |

Table 5. Summary of catch by species in 12 midwater rope trawls from the Bogoslof Island region during the winter 1992 EIMWT pollock survey, Miller Freeman cruise 92-2.

| <u>Species</u> | <u>Weight (lbs.)</u> | <u>Percent</u> | <u>Numbers</u> | <u>Percent</u> |
|---|--------------------------|----------------|----------------|----------------|
| Walleye Pollock (<u>Theragra chalcogramma</u>) | 26,234.3 | 99.4 | 12,142 | 88.1 |
| Smooth Lumpsucker (<u>Aptocyclus ventricosus</u>) | 50.7 | 0.2 | 12 | 0.1 |
| Jellyfish Unidentified (Scyphozoa) | 16.8 | 0.1 | - | - |
| Lanternfish Unidentified (Myctophidae) | 16.8 | 0.1 | 834 | 6.1 |
| Big Skate (<u>Raja binoculata</u>) | 10.0 | <.1 | 1 | <.1 |
| Chinook Salmon (<u>Oncorhynchus tshawytscha</u>) | 9.0 | <.1 | 3 | <.1 |
| Salps Unidentified (Thaliacea) | 8.4 | <.1 | - | - |
| Northern Smoothtongue (<u>Leuroglossus schmidtii</u>) | 8.2 | <.1 | 689 | 5.0 |
| Twoline Eelpout (<u>Bothrocara brunneum</u>) | 6.8 | <.1 | 3 | <.1 |
| Pacific Lamprey (<u>Lampetra tridentata</u>) | 6.4 | <.1 | 8 | 0.1 |
| Giant Grenadier (<u>Albatrossia pectoralis</u>) | 6.3 | <.1 | 1 | <.1 |
| Greenland Turbot (<u>Reinhardtius hippoglossoides</u>) | 5.0 | <.1 | 1 | <.1 |
| Magistrate Armhook Squid (<u>Berryteuthis magister</u>) | 2.8 | <.1 | 1 | <.1 |
| Rock Sole (<u>Pleuronectes bilineatus</u>) | 2.5 | <.1 | 1 | <.1 |
| Squid Unidentified (Teuthoida) | 2.3 | <.1 | 28 | 0.2 |
| Atka Mackerel (<u>Pleurogrammus monopterygius</u>) | 0.7 | <.1 | 7 | <.1 |
| Sockeye Salmon (<u>Oncorhynchus nerka</u>) | 0.4 | <.1 | 1 | <.1 |
| Viperfish Unidentified (Stomiidae) | 0.3 | <.1 | 3 | <.1 |
| Cyclothone Sp. (Gonostomatidae) | 0.3 | <.1 | 3 | <.1 |
| Glass Shrimp (<u>Pasiphaea pacifica</u>) | 0.2 | <.1 | 28 | 0.2 |
| Deepsea Smelt Unidentified (Bathylagidae) | 0.2 | <.1 | 3 | <.1 |
| Blackmouth Eelpout (<u>Lycodapus fierasfer</u>) | 0.1 | <.1 | 1 | <.1 |
| Comb Jelly Unidentified (Ctenophora) | 0.1 | <.1 | 8 | <.1 |
| Northern Pearleye (<u>Benthalbella dentata</u>) | 0.1 | <.1 | 1 | <.1 |
| Eulachon (<u>Thaleichthys pacificus</u>) | 0.1 | <.1 | 2 | <.1 |
| Totals | 26,388.8 | 100.0 | 13,781 | 100.0 |

Table 6. Summary of catch by species in 17 midwater rope trawls from Shelikof Strait during the winter 1992 EIMWT pollock survey, Miller Freeman cruise 92-2.

| <u>Species</u> | <u>Weight (lbs.)</u> | <u>Percent</u> | <u>Numbers</u> | <u>Percent</u> |
|---|--------------------------|----------------|----------------|----------------|
| Walleye Pollock (<u>Theragra chalcogramma</u>) | 64,882.5 | 96.7 | 56,158 | 76.4 |
| Eulachon (<u>Thaleichthys pacificus</u>) | 1,686.7 | 2.5 | 16,770 | 22.8 |
| Pacific Sleeper Shark (<u>Somniosus pacificus</u>) | 255.0 | 0.4 | 2 | <.1 |
| Big Skate (<u>Raja binoculata</u>) | 55.0 | 0.1 | 1 | <.1 |
| Arrowtooth Flounder (<u>Atheresthes stomias</u>) | 54.0 | 0.1 | 12 | <.1 |
| Magistrate Armhook Squid (<u>Berryteuthis magister</u>) | 51.3 | 0.1 | 187 | 0.3 |
| Rougheye Rockfish (<u>Sebastes aleutianus</u>) | 33.0 | <.1 | 13 | <.1 |
| Pacific Cod (<u>Gadus macrocephalus</u>) | 33.0 | <.1 | 5 | <.1 |
| Smooth Lumpsucker (<u>Aptocyclus ventricosus</u>) | 24.0 | <.1 | 9 | <.1 |
| Chinook Salmon (<u>Oncorhynchus tshawytscha</u>) | 15.5 | <.1 | 13 | <.1 |
| Northern Smoothtongue (<u>Leuroglossus schmidtii</u>) | 15.0 | <.1 | 265 | 0.4 |
| Jellyfish Unidentified (Scyphozoa) | 14.4 | <.1 | 26 | <.1 |
| Pink Salmon (<u>Oncorhynchus gorbuscha</u>) | 2.0 | <.1 | 2 | <.1 |
| Giant Octopus (<u>Octopus dofleini</u>) | 1.5 | <.1 | 1 | <.1 |
| Sidestripe Shrimp (<u>Pandalopsis dispar</u>) | 0.3 | <.1 | 12 | <.1 |
| Flathead Sole (<u>Hippoglossoides elassodon</u>) | 0.1 | <.1 | 2 | <.1 |
| Totals | 67,123.3 | 100.0 | 73,478 | 100.0 |

Table 7. Summary of catch by species in 8 bottom trawls from Shelikof Strait during the winter 1992 EIMWT pollock survey, Miller Freeman cruise 92-2.

| <u>Species</u> | <u>Weight (lbs.)</u> | <u>Percent</u> | <u>Numbers</u> | <u>Percent</u> |
|---|--------------------------|----------------|----------------|----------------|
| Walleye Pollock (<u>Theragra chalcogramma</u>) | 6,635.9 | 40.8 | 5,379 | 31.2 |
| Arrowtooth Flounder (<u>Atheresthes stomias</u>) | 3,277.0 | 20.1 | 991 | 5.7 |
| Dover Sole (<u>Microstomus pacificus</u>) | 2,142.9 | 13.2 | 838 | 4.9 |
| Pacific Halibut (<u>Hippoglossus stenolepis</u>) | 1,176.7 | 7.2 | 40 | 0.2 |
| Eulachon (<u>Thaleichthys pacificus</u>) | 874.8 | 5.4 | 7,348 | 42.6 |
| Flathead Sole (<u>Hippoglossoides elassodon</u>) | 784.0 | 4.8 | 727 | 4.2 |
| Skate Unidentified (Rajidae) | 446.1 | 2.7 | 22 | 0.1 |
| Sablefish (<u>Anoplopoma fimbria</u>) | 370.5 | 2.3 | 59 | 0.3 |
| Rougheye Rockfish (<u>Sebastes aleutianus</u>) | 145.7 | 0.9 | 59 | 0.3 |
| Magistrate Armhook Squid (<u>Berryteuthis magister</u>) | 117.1 | 0.7 | 68 | 0.4 |
| Rex Sole (<u>Errex zachirus</u>) | 87.1 | 0.5 | 119 | 0.7 |
| Sidestripe Shrimp (<u>Pandalopsis dispar</u>) | 49.7 | 0.3 | 1,316 | 7.6 |
| Bairdi Tanner Crab (<u>Chionoecetes bairdi</u>) | 36.9 | 0.2 | 37 | 0.2 |
| Pacific Cod (<u>Gadus macrocephalus</u>) | 34.3 | 0.2 | 7 | <.1 |
| Sea Anemone Unidentified (Actiniaria) | 26.5 | 0.2 | 118 | 0.7 |
| Shortspine Thornyhead (<u>Sebastolobus alascanus</u>) | 23.6 | 0.1 | 36 | 0.2 |
| Sculpin Unidentified (Cottidae) | 18.5 | 0.1 | 14 | 0.1 |
| Jellyfish Unidentified (Scyphozoa) | 11.5 | 0.1 | 13 | 0.1 |
| Eelpout Unidentified (Zoarcidae) | 7.6 | <.1 | 7 | <.1 |
| Golden King Crab (<u>Lithodes aequispina</u>) | 4.3 | <.1 | 2 | <.1 |
| Smooth Lumpsucker (<u>Aptocyclus ventricosus</u>) | 3.0 | <.1 | 1 | <.1 |
| Shortraker Rockfish (<u>Sebastes borealis</u>) | 3.0 | <.1 | 1 | <.1 |
| Oregon Triton (<u>Fusitriton oregonensis</u>) | 2.1 | <.1 | 13 | 0.1 |
| Longsnout Prickleback (<u>Lumpenella longirostris</u>) | 0.7 | <.1 | 3 | <.1 |
| Snailfish Unidentified (Cyclopteridae) | 0.7 | <.1 | 8 | <.1 |
| Ctenodiscus Sp. (Goniopectinidae) | 0.6 | <.1 | 13 | 0.1 |
| Hermit Crab Unidentified (Paguridae) | 0.4 | <.1 | 4 | <.1 |
| Sea Pen Unidentified (Pennatulacea) | 0.2 | <.1 | 1 | <.1 |
| Sea Cucumber Unidentified (Holothuroidea) | 0.1 | <.1 | 1 | <.1 |
| Basketstarfish (<u>Gorgonocephalus caryi</u>) | 0.1 | <.1 | 1 | <.1 |
| Totals | 16,281.6 | 100.0 | 17,246 | 100.0 |

Table 8. Summary of pollock biological samples and measurements from the winter 1992 EIMWT pollock survey of the Bering Sea and Gulf of Alaska, Miller Freeman cruise 92-2, leg 1.

| HAUL | | | | FISH | OVARY | STOMACH | LAMPREY | |
|-------|--------|----------|---------|------|-------|---------|---------|---------|
| NO. | LENGTH | MATURITY | OTOLITH | WGT | WGT | SCAN | SCAN | GENETIC |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 354 | 100 | 100 | 100 | 50 | 16 | 100 | 0 |
| 3 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 311 | 84 | 84 | 84 | 40 | 15 | 84 | 0 |
| 5 | 309 | 110 | 110 | 110 | 41 | 0 | 73 | 30 |
| 6 | 369 | 100 | 100 | 100 | 20 | 0 | 100 | 20 |
| 7 | 48 | 0 | 0 | 0 | 0 | 0 | 48 | 0 |
| 8 | 619 | 47 | 47 | 47 | 0 | 0 | 15 | 0 |
| 9 | 280 | 67 | 67 | 67 | 2 | 0 | 0 | 0 |
| 10 | 255 | 49 | 49 | 49 | 4 | 16 | 0 | 0 |
| 11 | 353 | 66 | 66 | 66 | 8 | 16 | 0 | 0 |
| 12 | 296 | 81 | 81 | 81 | 40 | 4 | 81 | 0 |
| 13 | 269 | 56 | 56 | 56 | 0 | 16 | 0 | 0 |
| 14 | 47 | 47 | 47 | 47 | 14 | 8 | 47 | 0 |
| 15 | 210 | 99 | 99 | 99 | 95 | 0 | 99 | 14 |
| 16 | 318 | 109 | 109 | 109 | 86 | 0 | 109 | 11 |
| 17 | 110 | 94 | 94 | 94 | 72 | 0 | 94 | 15 |
| 18 | 365 | 128 | 128 | 128 | 42 | 0 | 128 | 10 |
| 19 | 329 | 105 | 105 | 105 | 97 | 0 | 105 | 0 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 368 | 49 | 49 | 49 | 18 | 0 | 49 | 0 |
| 22 | 257 | 62 | 62 | 62 | 5 | 0 | 62 | 0 |
| 23 | 328 | 60 | 60 | 0 | 0 | 0 | 60 | 0 |
| 24 | 335 | 59 | 59 | 59 | 17 | 0 | 59 | 0 |
| 25 | 349 | 81 | 81 | 81 | 12 | 0 | 81 | 0 |
| 26 | 243 | 103 | 103 | 103 | 25 | 0 | 103 | 0 |
| <hr/> | | | | | | | | |
| TOTAL | 6886 | 1756 | 1756 | 1696 | 688 | 91 | 1497 | 100 |

Table 9. Summary of pollock biological samples and measurements from the winter 1992 EIMWT pollock survey of the Gulf of Alaska, Miller Freeman cruise 92-2, leg 2.

| HAUL NO. | LENGTH | MATURITY | OTOLITH | FISH WGT | OVARY WGT | STOMACH SCAN | LAMPREY SCAN | GENETIC | FECUNDITY |
|-------------|--------|----------|---------|-------------|--------------|-----------------|-----------------|---------|-----------|
| 27 | 327 | 85 | 85 | 85 | 38 | 0 | 0 | 0 | 0 |
| 28 | 449 | 72 | 72 | 72 | 32 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | 61 | 61 | 0 | 0 | 0 | 32 | 0 | 0 | 0 |
| 32 | 395 | 70 | 70 | 70 | 1 | 0 | 0 | 0 | 0 |
| 33 | 217 | 54 | 54 | 54 | 4 | 32 | 54 | 0 | 0 |
| 34 | 393 | 111 | 111 | 111 | 0 | 0 | 111 | 0 | 0 |
| 35 | 153 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 |
| 36 | 282 | 92 | 92 | 92 | 17 | 0 | 92 | 0 | 0 |
| 37 | 327 | 98 | 98 | 98 | 2 | 0 | 98 | 0 | 0 |
| 38 | 343 | 111 | 0 | 0 | 0 | 28 | 111 | 0 | 0 |
| 39 | 387 | 137 | 0 | 0 | 0 | 16 | 0 | 0 | 0 |
| 40 | 294 | 49 | 49 | 49 | 10 | 0 | 49 | 0 | 0 |
| 41 | 285 | 99 | 0 | 0 | 0 | 21 | 0 | 0 | 0 |
| 42 | 261 | 56 | 56 | 56 | 0 | 12 | 56 | 0 | 0 |
| 43 | 104 | 104 | 0 | 0 | 0 | 8 | 0 | 0 | 0 |
| 44 | 259 | 72 | 72 | 72 | 2 | 0 | 72 | 0 | 0 |
| 45 | 273 | 87 | 87 | 87 | 2 | 0 | 87 | 0 | 0 |
| 46 | 384 | 112 | 112 | 112 | 11 | 0 | 112 | 0 | 0 |
| 47 | 529 | 88 | 0 | 0 | 0 | 17 | 0 | 0 | 0 |
| 48 | 333 | 127 | 127 | 127 | 0 | 20 | 127 | 0 | 0 |
| 49 | 396 | 91 | 91 | 91 | 0 | 0 | 91 | 0 | 0 |
| 50 | 197 | 55 | 55 | 55 | 26 | 0 | 55 | 15 | 21 |
| 51 | 174 | 85 | 85 | 85 | 6 | 0 | 85 | 15 | 0 |
| 52 | 176 | 110 | 110 | 110 | 23 | 0 | 110 | 0 | 0 |
| 53 | 266 | 97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 54 | 215 | 130 | 130 | 0 | 0 | 0 | 130 | 0 | 0 |
| 55 | 317 | 95 | 95 | 95 | 37 | 0 | 95 | 20 | 11 |
| 56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 268 | 88 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| 60 | 132 | 93 | 93 | 0 | 0 | 0 | 93 | 0 | 0 |
| TOTAL | 8197 | 2529 | 1744 | 1521 | 211 | 203 | 1628 | 50 | 32 |

Table 10. Inventory of CTD casts, Miller Freeman cruise 92-2.

| CAST | HAUL | DATE (1992) | TIME (AST) | POSITION | | DEPTH (m) | | COMMENTS |
|------|-------|----------------|---------------|----------|----------|-----------|--|-----------------|
| | | | | LAT (N) | LONG (W) | CAST/BOTM | | |
| 1 | - | Feb 22 | 0019 | 57 29.7 | 152 52.0 | 59/67 | | cal. Ugak Bay |
| 2 | 1 | Feb 22 | 2116 | 55 35.7 | 155 49.3 | 174/185 | | near Chirikof |
| 3 | 2 | Feb 25 | 1415 | 55 41.8 | 163 05.5 | 58/70 | | EBS Tr. 1.0 |
| 4 | 3,4 | Feb 26 | 1559 | 56 02.5 | 164 26.1 | 78/90 | | EBS Tr. 4.0 |
| 5 | 5 | Feb 27 | 0321 | 54 49.6 | 164 52.5 | 63/71 | | EBS Tr. 5.0 |
| 6 | 6 | Feb 27 | 1121 | 55 42.1 | 164 53.1 | 86/96 | | EBS Tr. 5.0 |
| 7 | 7 | Feb 27 | 2300 | 54 53.5 | 165 16.8 | 113/123 | | EBS Tr. 6.0 |
| 8 | 8 | Feb 28 | 1140 | 54 15.1 | 165 44.0 | 92/102 | | EBS Tr. 7.0 |
| 9 | 9 | Feb 28 | 1833 | 54 46.5 | 165 46.6 | 185/198 | | EBS Tr. 7.0 |
| 10 | 10 | Feb 29 | 0314 | 55 38.2 | 166 06.2 | 113/121 | | EBS Tr. 7.1 |
| 11 | 11 | Feb 29 | 1308 | 55 02.2 | 166 12.5 | 130/139 | | EBS Tr. 8.0 |
| 12 | 13 | Mar 01 | 0937 | 54 50.7 | 167 03.0 | 288/307 | | EBS Tr. 10.0 |
| 13 | 14 | Mar 01 | 2142 | 54 15.7 | 166 59.5 | 684/1281 | | EBS Tr. 10.0 |
| 14 | 15 | Mar 02 | 0935 | 54 32.2 | 167 32.5 | 679/699 | | EBS Tr. 12.0 |
| 15 | 17 | Mar 03 | 0841 | 54 09.1 | 168 05.9 | 609/2123 | | EBS Tr. 14.0 |
| 16 | 19 | Mar 05 | 0611 | 53 02.9 | 169 18.2 | 773/1016 | | EBS Tr. 18.0 |
| 17 | 20 | Mar 06 | 1258 | 53 57.0 | 168 17.2 | 673/1702 | | EBS Tr. 21.0 |
| 18 | 21,22 | Mar 07 | 0249 | 54 30.2 | 167 53.8 | 588/1085 | | EBS Tr. 22.0 |
| 19 | 23,24 | Mar 07 | 2140 | 54 22.8 | 167 35.7 | 624/796 | | near Bog. Is. |
| 20 | 25 | Mar 08 | 0654 | 53 43.7 | 167 43.3 | 680/1874 | | EBS Tr. 23.0 |
| 21 | 26 | Mar 09 | 1117 | 54 06.9 | 162 25.1 | 644/805 | | Sanak Tr. 3.0 |
| 22 | 27 | Mar 14 | 0059 | 57 59.8 | 152 20.3 | 334/350 | | GOA Tr. 3.0 |
| 23 | 28 | Mar 14 | 0727 | 57 59.3 | 152 33.6 | 172/183 | | GOA Tr. 9.0 |
| 24 | 29 | Mar 15 | 0341 | 58 06.9 | 150 31.2 | 170/178 | | GOA Tr. 23.0 |
| 25 | 30 | Mar 16 | 0751 | 57 09.8 | 151 00.6 | 515/593 | | GOA Tr. 35.0 |
| 26 | 31 | Mar 16 | 1422 | 57 31.3 | 151 28.5 | 130/137 | | GOA Tr. 40.0 |
| 27 | 32 | Mar 18 | 0021 | 56 30.6 | 153 39.4 | 123/134 | | GOA Tr. 61.0 |
| 28 | 33 | Mar 20 | 0313 | 56 10.6 | 156 05.9 | 231/242 | | SH Tr. 102.0 |
| 29 | 34,35 | Mar 20 | 1013 | 56 19.9 | 156 14.7 | 260/275 | | SH Tr. 103.0 |
| 30 | 36 | Mar 21 | 0152 | 56 37.6 | 155 28.6 | 144/154 | | SH Tr. 106.0 |
| 31 | 37,38 | Mar 21 | 0548 | 56 41.6 | 155 56.6 | 283/298 | | SH Tr. 106.0 |
| 32 | 39 | Mar 21 | 1712 | 56 48.9 | 155 48.8 | 284/295 | | SH Tr. 107.0 |
| 33 | 40,41 | Mar 22 | 1659 | 57 15.2 | 155 30.6 | 258/344 | | SH Tr. 111.0 |
| 34 | 42 | Mar 23 | 0017 | 57 11.1 | 155 06.3 | 212/221 | | SH Tr. 111.0 |
| 35 | 43,44 | Mar 23 | 1130 | 57 26.7 | 155 04.0 | 223/232 | | SH Tr. 113.0 |
| 36 | 45 | Mar 23 | 1447 | 57 27.6 | 154 45.8 | 107/115 | | SH Tr. 113.1 |
| 37 | 46,47 | Mar 23 | 1947 | 57 36.1 | 155 19.3 | 300/315 | | SH Tr. 114.0 |
| 38 | 48 | Mar 24 | 0934 | 57 45.2 | 154 11.1 | 161/179 | | SH Tr. 118.0 |
| 39 | 49,50 | Mar 24 | 1409 | 57 55.9 | 154 33.0 | 258/269 | | SH Tr. 118.0 |
| 40 | 51 | Mar 24 | 2336 | 58 03.9 | 154 11.2 | 260/280 | | SH Tr. 120.1 |
| 41 | -- | Mar 25 | 1104 | 58 12.9 | 153 01.9 | 59/71 | | cal. Malina Bay |
| 42 | 52,53 | Mar 25 | 1905 | 58 06.7 | 154 09.3 | 287/298 | | SH Tr. 204.0 |
| 43 | 54 | Mar 26 | 0536 | 58 02.3 | 154 18.1 | 248/267 | | SH Tr. 208.0 |
| 44 | 55 | Mar 26 | 1439 | 57 52.4 | 154 55.5 | 214/225 | | SH Tr. 214.0 |
| 45 | 56,57 | Mar 29 | 0847 | 54 40.7 | 156 09.5 | 492/3660 | | CH Tr. 311.0 |
| 46 | 58 | Mar 29 | 2127 | 54 59.0 | 156 36.0 | 501/1552 | | CH Tr. 312.0 |
| 47 | 59 | Mar 30 | 0909 | 56 20.9 | 155 41.2 | 63/73 | | CH Tr. 313.0 |
| 48 | 60 | Mar 31 | 1021 | 58 04.8 | 154 11.5 | 269/289 | | CH Tr. 317.0 |

Tr. = Transect

Table 11. Inventory of XBT drops, Miller Freeman cruise 92-2.

| DROP NO.* | HAUL | DATE (1992) | TIME (AST) | POSITION | | BOTTOM DEPTH (m) | | COMMENTS |
|-----------|------|---------------|------------|----------|----------|------------------|--|--------------|
| | | | | LAT (N) | LONG (W) | | | |
| 22 | - | Feb 25 | 1021 | 55 37.4 | 163 05.8 | 60 | | EBS Tr. 1.0 |
| 23 | - | Feb 25 | 2054 | 56 13.4 | 163 32.8 | 84 | | EBS Tr. 2.0 |
| 24 | - | Feb 26 | 0202 | 55 12.3 | 163 33.3 | 44 | | EBS Tr. 2.0 |
| 25 | - | Feb 26 | 0642 | 55 39.6 | 164 00.0 | 93 | | EBS Tr. 3.0 |
| 26 | - | Feb 27 | 1818 | 55 35.6 | 164 26.5 | 94 | | EBS Tr. 4.0 |
| 27 | - | Feb 27 | 2007 | 55 13.2 | 164 26.6 | 92 | | EBS Tr. 4.0 |
| 28 | - | Feb 27 | 1830 | 55 11.9 | 165 20.1 | 112 | | EBS Tr. 6.0 |
| 29 | - | Feb 28 | 0209 | 54 24.7 | 165 20.4 | 161 | | EBS Tr. 6.0 |
| 30 | - | Feb 29 | 0920 | 55 10.7 | 166 13.1 | 133 | | EBS Tr. 8.0 |
| 31 | - | Feb 29 | 1705 | 54 25.8 | 166 14.3 | 500 | | EBS Tr. 8.0 |
| 32 | 16 | Mar 02 | 1609 | 53 54.6 | 167 34.0 | >1300 | | EBS Tr. 12.0 |
| 33 | | --BAD DROP!-- | | | | | | |
| 34 | 18 | Mar 03 | 1426 | 53 50.7 | 168 06.9 | 1830 | | EBS Tr. 14.0 |
| 35 | - | Mar 03 | 2248 | 54 42.3 | 168 27.5 | 1922 | | EBS Tr. 15.0 |
| 36 | | --BAD DROP!-- | | | | | | |
| 37 | - | Mar 04 | 0744 | 53 24.8 | 168 44.6 | 732 | | EBS Tr. 16.0 |
| 38 | - | Mar 04 | 1454 | 54 01.7 | 169 01.7 | 1830 | | EBS Tr. 17.0 |
| 39 | | --BAD DROP!-- | | | | | | |
| 40 | - | Mar 04 | 1946 | 54 27.9 | 169 19.1 | 2131 | | EBS Tr. 18.0 |
| 41 | - | Mar 04 | 2352 | 53 38.1 | 169 18.4 | 2195 | | EBS Tr. 18.0 |

* XBT drops 1-21 on MF92-1.

Tr. = Transect